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(2436-124)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of	) **BEFORE THE BOARD OF PATENT**
	) **APPEALS AND INTERFERENCES**
John T. PAWLAK et al.	)
	) Appeal No.:
Serial No. 10/608,704	)
	) Examiner: David S. Baker
Filed: June 27, 2003	)
	) Group Art Unit: 2884
For: NON-CIRCULAR ORBIT	)
DETECTION METHOD AND	) October 10, 2006
APPARATUS	) (Tuesday After Holiday)

BRIEF ON APPEAL

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the final rejection of claims 11-24 and 27-30 of the above-identified application, which claims were finally rejected in the Office action dated March 8, 2006. A Notice of Appeal was timely filed on August 8, 2006.

REAL PARTY IN INTEREST

The real party in interest in this case is Siemens Medical Solutions USA, Inc. of Malvern, PA.

RELATED APPEALS AND INTERFERENCES

There are no related appeals or interferences, which would have any direct or indirect affect on the Board's decision in the present appeal.

STATUS OF THE CLAIMS

Claims 1-30 are pending in the application. Claims 1-10, 25 and 26 stand allowed. Claims 11-24 and 27-30 stand finally rejected. Claims 11, 13 and 27 constitute the independent claims on appeal. This appeal is directed to claims 11-24 and 27-30.

STATUS OF AMENDMENTS

No proposed amendment after final has been filed in this application.

SUMMARY OF THE CLAIMED SUBJECT MATTER

The present invention relates generally to the field of nuclear medical imaging and more particularly to a detector that orbits around a patient to acquire imaging data for use in reconstruction of tomographic images of the patient.

For certain detectors, it is desired to keep the detector head as close as possible to a patient's body as this results in higher image resolution and increased sensitivity,

thereby achieving either a higher quality image (if scan time is held constant as compared to non-body proximal detection) or a decreased patient scan time (if image quality is held constant as compared to non-body proximal detection). To achieve the desired result of maintaining the detector as close as possible to the patient's body, it is known to make the orbit of a detector non-circular so as to more closely conform to the non-circular contour of a patient's body (see patient contour P, FIG. 1).

The present invention provides significant improvements to the known methods of providing non-circular orbits to nuclear imaging detectors. According to the invention as set forth in claim 11, a first detector is moved in a first direction toward a patient to a position adjacent to the patient based on output of a sensor that senses patient proximity to the first detector, moving a second detector in a second direction toward the patient to a position adjacent to the patient based on output of a sensor that senses patient proximity to the second detector, calculating an orbital path of the first and second detectors around the patient based on the positions of the first and second detectors adjacent to the patient, and using the calculated orbital path to move the first and second detectors about the patient to obtain image data of the patient.

This is described at page 13, line 11 to page 14, line 28 referencing FIGs. 1-3, wherein a controller **50** controls operation of a carrier mechanism **40** to move first and second detectors **10** and **20** toward and away from patient **P** in directions indicated by arrows **A2**, **A3**, and **A4**. First, the pair of detectors is unitarily moved in direction **A2**. Sensors **60** and **70** detect patient proximity by detecting interruption of a light beam

from emitter **70E** to receiver **70R**, or from emitter **60E** to receiver **60R.** Upon interruption of the light beam, movement of the detectors is stopped and the position recorded. The detector other than the one having the interrupted light beam is then moved toward the patient in direction **A3**, until its light beam is interrupted, as shown in FIG. 3. This position also is recorded. Using the detected positional information, the system calculates a desired orbital path for the first and second detectors to follow during an imaging data acquisition scan.

Independent claim 13 is an apparatus claim analogous to method claim 11 and requires a first detector (**10**, Fig. 1), a first sensor element (**60**, Fig. 1) to sense patient proximity to the first detector, a second detector (2**0**, Fig. 1), a second sensor element (**70**, Fig. 1) to sense patient proximity to the second detector, a first carrier mechanism (**40**, Fig. 1) to move the first detector to a position adjacent to the patient based on output of the first sensor, a second carrier mechanism (also denoted as **40**, Fig. 1) to move the second detector to a position adjacent to the patient based on output of the second sensor, and a control unit (**50**, Fig. 1) to calculate an orbital path around the patient based upon the first and second positions so identified by the sensors. This structure is described at page 8, line 25, to page 10, line 12.

Independent claim 27 is directed to a method for nuclear medicine imaging with a non-circular orbiting detector, comprising automatically determining a plurality of orbital locations around a perimeter of a patient before performing image data acquisition, automatically predetermining a non-circular orbit around the patient based on the

plurality of locations, and moving the detector along the predetermined non-circular orbit for acquisition of nuclear medicine data. This is explained at page 13, line 11 to page 15, line 34.

GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

This appeal presents the following issues for review by the Board:

1) Whether claims 11 and 12 are unpatentable as being obvious over Stephan, U.S. Patent No. 5,677,535, in view of Lonn, U.S. Patent No. 5,777,332, and are properly rejected on that basis;

2) Whether claims 13-19 are unpatentable as being obvious over Kovacs (USP 4,503,331) and Ohike (USP 5,691,538) in view of Lonn, and are properly rejected on that basis;

3) Whether claims 20-22 are unpatentable as being obvious over Kovacs in view of Ohike and Lonn and further in view of Hug (USP 5,444,252), and are properly rejected on that basis;

4) Whether claims 23 and 24 are unpatentable as being obvious over Kovacs in view of Ohike and Lonn and further in view of Stephan, and are properly rejected on that basis;

5) Whether claims 27, 28 and 30 are unpatentable over Lonn in view of Stephan and are properly rejected on that basis; and

6) Whether claim 29 is unpatentable over Lonn in view of Stephan and further in view of Kovacs and is properly rejected on that basis.

ARGUMENT

The Rejection of Claims 11 and 12 Is Improper

The rejection of claims 11 and 12 as being obvious over Stephan, U.S. Patent No. 5,677,535, in view of Lonn, U.S. Patent No. 5,777,332, is improper and should be reversed. The final rejection alleges that it would have been obvious to use the "orbit calculation methods" allegedly taught by Lonn together with the proximity detection method of Stephan.[1] This position is incorrect, because Lonn does not suggest using the position detection methodology of Stephan to calculate an orbital path around a patient.

Stephan discloses the use of three sensing planes 13, 14 and 15 across the face of a collimator (Fig. 2), such that an algorithm keeps the patient within the boundaries of planes 13 and 14, and away from boundary 15. This is the same prior art method as described in the present application with respect to Fig. 7(A) and page 2, line 28 to page 3, line 10 of the specification. Stephan does not store proximity positions of detectors in order to determine or calculate an orbital path to be used by the apparatus in moving the detectors about the patient to acquire data.

With respect to claims 11 and 12, first, Stephan neither determines nor calculates any orbital path to be used by the apparatus in moving the detectors about the patient to acquire data. Thus, the assertion of the final Office action that Stephan determines an orbital path around the patient based on positions determined by the sensors is incorrect. Stephan discloses the use of three sensing planes 13, 14 and 15 across the face of a collimator (Fig. 2), in the form of infrared beams that are interrupted by the

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1 The Advisory action states that Appellants' argument is "irrelevant" because the rejection is based on the "apparatus" of Stephan, not the "method" of Stephan, in combination with the "method and apparatus" of Lonn. This position is erroneous because, as a matter of law, prior art references must be considered as a whole for what they suggest to those skilled in the art, and cannot be used out of context to selectively pick and choose elements in an effort to reconstruct the claimed invention. Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc., 796 F.2d 443, 230 USPQ 416 (Fed. Cir. 1986); In re Fritch, 972 F.2d 1260, 23 USPQ2d 1780 (Fed. Cir. 1992).

body of the patient, such that an algorithm keeps the patient within the boundaries of planes 13 and 14, and away from boundary 15. This is the same prior art method as described in the present application with respect to Fig. 7(A). Contrary to the assertion of the final rejection, the teaching of Stephan requires that the detectors 7, 8 be moved toward and away from the patient at each imaging position, to obtain an image acquisition position prior to acquiring image projection data.

Lonn discloses moving a camera and patient table relative to one another to allow an operator to define a non-circular orbit. This is discussed as prior art Fig. 7(B) of the present application. Thus, second, column 4 of Lonn, cited by the Office action as alleged motivation for the purported combination, actually describes at lines 41-60 the Stephan method, and therefore does not suggest to one of ordinary skill in the art any modification of Stephan, much less the proposed modification. Lonn goes on to disclose at columns 6-9, relied upon in the final rejection, the operator-defined orbit calculation that is the subject of the Lonn invention.

Thus, there is no teaching within the Lonn disclosure from which one of ordinary skill in the art would have attempted to use the approach and safety plane proximity detection of Stephan to somehow calculate an orbital path around a patient, as asserted in the final Office action. Lonn teaches away from the “autosensing” method of Stephan as being “tedious and time-consuming” (col. 4, lines 61-62) in favor of the operator-performed path calculation as disclosed by Lonn. For at least these reasons, this ground of rejection is improper and should be reversed.

The Rejection of Claims 13-19 Is Improper

The rejection of claims 13-19 as being unpatentable over Kovacs (USP 4,503,331) and Ohike (USP 5,691,538) in view of Lonn, also is improper and should be reversed. One skilled in the art would find no motivation from Lonn to modify Kovacs

and/or Ohike to perform an orbital path calculation based on first and second determined detector positions as asserted in the final Office action.

Kovacs (cited at page 2 of the specification) discloses at col. 3, lines 48-55 the prior art method shown in Fig. 7(B), and at col. 3, line 63 – col. 4, line 2, discloses the prior art method as shown in Fig. 7(A). Kovacs fails to disclose the predetermination or calculation of a non-circular orbit by moving first and second detectors toward a patient to positions where proximity points are sensed by sensor elements, and then determining an orbital path using the detected positions.

Ohike discloses the use of distance sensors to measure the distance between the object under examination and the detectors; however Ohike also fails to disclose the predetermination or calculation of a non-circular orbit by moving first and second detectors toward a patient to positions where proximity points are sensed by sensor elements, and then determining an orbital path using the detected positions, as set forth in claims 13-19.

As explained above, Lonn teaches away from autosensing methods of detector proximity location in favor of an operator-performed procedure for orbit calculation. The Office action's proposal to use the teaching of Lonn to calculate orbital paths in Kovacs as modified by Ohike, would thus similarly fail to result in the claimed invention as set forth in claim 13.

In this regard, it is noted that Lonn does not teach calculation of orbital paths based on "first and second positions" as alleged in the final rejection. To the contrary,

Lonn teaches that "[t]he set-up for a patient body contour tomographic scan in accordance with the present invention requires that the operator specify the acquisition arc over which data will be taken." See Col. 6, lines 60-65. Consequently, this ground of rejection is improper and should be reversed.

The Rejection of Claims 20-24 Is Improper

The rejection of claims 20-22 as being unpatentable over Kovacs in view of Ohike and Lonn and further in view of Hug (USP 5,444,252), and claims 23 and 24 as being unpatentable over Kovacs in view of Ohike and Lonn and further in view of Stephan, are respectfully traversed.

Claims 20-24 all depend from independent claim 13 and therefore include all the limitations of claim 13. Hug, cited for disclosing the orientation of detectors at 90 degree angles to each other, fails to cure the deficiencies of Kovacs and Ohike with respect to claim 13, and as such cannot render claims 20-22 obvious. Similarly, Stephan is deficient with respect to the invention of claim 13 as demonstrated above; consequently claims 23 and 24 are not rendered obvious by any addition of Stephan to the collective teachings of Kovacs, Ohike and Lonn. Accordingly, these grounds of rejection are improper and should be reversed.

<u>The Rejection of Claims 27-30 Is Improper</u>

The rejection of claims 27, 28 and 30 as being unpatentable over Lonn in view of Stephan, and claim 29 as being unpatentable over Lonn in view of Stephan and further in view of Kovacs, also are improper and should be reversed.

As explained above, claim 27 requires a method for nuclear medicine imaging with at least one nuclear medicine detector that follows a non-circular orbit, comprising: a) automatically determining a plurality of orbital locations around a perimeter of a patient before performing image data acquisition; b) automatically predetermining a non-circular orbit around a patient based, at least in part, upon said plurality of locations; and c) moving at least one nuclear medicine detector along said predetermined non-circular orbit around said patient for acquisition of nuclear medicine data.

As also explained above, neither Lonn nor Stephan teach the automatic determination of a plurality of orbital locations around a patient perimeter before performing image data acquisition. Lonn requires an operator to specify an imaging arc, and Stephan requires detector position calibration at each imaging angle. Further, neither Lonn nor Stephan teach the automatic predetermination of a non-circular orbit based at least in part upon the plurality of automatically determined locations, as explained above. Again, Lonn teaches away from “autosensing” methods in favor of operator-defined orbits, and Stephan teaches nothing at all concerning the

predetermination of an orbital path around a patient. Based on these facts, the rejection of claims 27, 28 and 30 is untenable and reversal thereof is requested.

Claim 29 includes the limitations of independent claim 27 and is not rendered obvious by any addition of Kovacs to the proposed Lonn/Stephan combination, as explained above. Accordingly, these grounds of rejection are improper on the record and should be reversed.

CONCLUSION

In view of the foregoing, claims 11-24 and 27-30 are submitted to be directed to a new and unobvious method and apparatus for obtaining and using a non-circular detector orbit for use in association with a nuclear imaging device, which is not taught

by the prior art. The Honorable Board is respectfully requested to reverse all grounds of rejection and to direct the passage of this application to issue.

Please charge any fee or credit any overpayment pursuant to 37 CFR 1.16 or 1.17 to Novak Druce Deposit Account No. 14-1437.

Respectfully submitted,

NOVAK, DRUCE, DELUCA + QUIGG LLP

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CLAIMS APPENDIX

11. A method for orbital calculation, comprising:

a) moving, relative to a patient, a first detector in a first direction toward said patient to a position adjacent to said patient based on an output of a sensor that senses patient proximity to said first detector;

b) moving, relative to the patient, a second detector in a second direction toward the patient to a position adjacent to said patient based on an output of a sensor that senses patient proximity to said second detector:

c) calculating an orbital path of said first and second detectors around the patient based upon said position adjacent to said patient in part a) and said position adjacent to said patient in part b); and

d) using said calculated orbital path to move said first and second detectors about said patient to obtain image data of said patient.

12. The method of claim 11, further including performing said moving in parts a) and b) automatically.

13. An orbital-detector apparatus, comprising:

a) a first detector element to detect inside a patient;

b) a first sensor element to sense patient proximity to said first detector element;

c) a second detector element to detect inside the patient;

d) a second sensor element to sense patient proximity to said second detector element;

e) a first carrier mechanism configured to move said first detector element in a first direction from a position distal to the patient to a first position adjacent to said patient based on an output of said first sensor element;

f) a second carrier mechanism configured to move said second detector element in a second direction from a position distal to the patient to a second position proximate to said patient based on an output of said second sensor element;

g) a control unit configured to calculate an orbital path of at least one of said first detector element and second detector element around the patient based upon said first and second positions.

14. The apparatus of claim 13, wherein said orbital path is a non-circular orbit.

15. The apparatus of claim 13, wherein said apparatus is a nuclear medicine imaging apparatus.

16. The apparatus of claim 13, wherein said apparatus varies a radius of said orbital path to reduce a distance of said first and second detector elements from the patient.

17. The apparatus of claim 13, wherein at least one of said first detector element and said second detector element includes a parallel-hole collimated detector.

18. The apparatus of claim 13, wherein front surfaces of said first detector element and said second detector element are at an angle of less than about 180 degrees from one another.

19. The apparatus of claim 13, wherein front surfaces of said first detector element and said second detector element are at an angle of about 90 degrees from one another.

20. The apparatus of claim 19, wherein said first direction is generally downward.

21. The apparatus of claim 20, wherein said first direction is generally vertical.

22. The apparatus of claim 21, wherein said second direction is generally parallel to a front of said first detector element.

23. The apparatus of claim 13, wherein said first sensor element emits a light beam that is broken by proximity to a patient.

24. The apparatus of claim 13, wherein said second sensor element emits a light beam that is broken by proximity to a patient.

27. A method for nuclear medicine imaging with at least one nuclear medicine detector that follows a non-circular orbit, comprising:

a) automatically determining a plurality of orbital locations around a perimeter of a patient before performing image data acquisition;

b) automatically predetermining a non-circular orbit around a patient based, at least in part, upon said plurality of locations;

c) moving at least one nuclear medicine detector along said predetermined non-circular orbit around said patient for acquisition of nuclear medicine data.

28. The method of claim 27, wherein said automatically determining in a) includes determining the locations by sensing a proximity to a patient of at least two detectors which are arranged in a V-configuration during data acquisition.

29. The method of claim 28, wherein said automatically determining in b) includes calculating a non-circular orbit using a controller.

30. The method of claim 27, wherein said automatically determining in a) includes establishing at least one location based on at least one location against which the patient is supported.

EVIDENCE APPENDIX

None

RELATED PROCEEDINGS APPENDIX

None